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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/913,611	08/16/2001	Shigeru Murakami	Q54917	2483

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EXAMINER	
PIERCE, JEREMY R	
ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/913,611	MURAKAMI ET AL.	
	Examiner	Art Unit	
	Jeremy R. Pierce	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-7 and 9-15* is/are pending in the application.

4a) Of the above claim(s) *9-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-7 and 13-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on March 24, 2005 has been entered. Claims 3-7, 13, and 15 have been amended. Claim 8 has been cancelled. Claims 3-7 and 9-15 are currently pending with claims 9-12 withdrawn from consideration. Applicant's arguments concerning the Fischer et al. (U.S. Patent No. 3,723,610) not being a cellulose-based fabric are persuasive to overcome the rejections set forth in sections 5, 8, and 11 of the last Office Action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 3, 6, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickson et al. (U.S. Patent No. 3,484,183) in view of Kajiyama et al. (U.S. Patent No. 4,614,692).

Dickson et al. disclose a woven carbon fabric obtained by firing a cellulose-based woven fabric (column 2, lines 23-32). In an example, Dickson et al. describe the resistivity to be approximately 0.1 ohm-cm (column 10, line 74). Also in this example, Dickson et al. disclose the thickness of the fabric to be 25 mils (column 10, line 72),

which equals 0.635 mm. Dickson et al. do not disclose the fabric to have a thickness between 0.05 and 0.4 mm. Kajiyama et al. teach that the thickness of a porous fuel cell can be made to be between 0.1 and 2 mm (column 4, lines 55-61). It would have been obvious to a person having ordinary skill in the art at the time of the invention to make the carbon cloth of Dickson et al. with a thickness between 0.1 and 2 mm in order to create a carbon cloth that may find varying uses as a fuel cell, as taught by Kajiyama et al.

With regard to other property limitations in the claims, although Dickson et al. do not explicitly teach the limitations of gas permeability, compressive strength, and electrical resistance measured between two copper plates, it is reasonable to presume that said limitations are inherent to the invention. Support for said presumption is found in the use of similar materials (i.e. cellulose-based woven fabric) and in the similar production steps (i.e. firing at a high temperature in a non-oxidizing atmosphere to create a carbon fabric) used to produce the conductive carbon fabric. For instance, Applicant discloses using conventional cellulose-based fabrics based on a plain weave (page 8, lines 19-28 and page 17, line 6). Dickson et al. also disclose using commercial cellulose based fabrics based on a plain weave (column 7, lines 51-54). Additionally, the processes used to create the fabrics are similar because Dickson et al. disclose immersing the fabric in metal phosphate salt before carbonizing (column 2, lines 63-71), as does Applicant (page 17, lines 15-18). Afterward Dickson et al. bake the fabric at very high temperature in a non-oxidizing atmosphere (column 10, lines 64-67), as does Applicant (page 17, lines 18-22). The burden is on the Applicant to prove otherwise.

In the alternative, the claimed properties would obviously have been provided by the process disclosed by Dickson et al. by way of adjusting result effective variables to improve the conductivity of the fabric. Dickson et al. teach various ways to improve strength and electrical conductivity (column 13, line 55 –column 14, line 75). With regard to claim 6, Dickson et al. also disclose using a commercial plain weave cellulose-based fabric (column 7, lines 51-54).

4. Claims 3, 6, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Millington et al. (U.S. Patent No. 3,294,489) in view of Kajiyama et al. and alternatively in further view of Sharlit.

Millington et al. discloses a cellulose-based carbon fiber fabric that is fired at high temperature (column 2, lines 19-23). Millington et al. do not teach the thickness of the fabric. Kajiyama et al. teach that the thickness of a porous fuel cell can be made to be between 0.1 and 2 mm (column 4, lines 55-61). It would have been obvious to a person having ordinary skill in the art at the time of the invention to make the carbon cloth of Millington et al. with a thickness between 0.1 and 2 mm in order to create a carbon cloth that may find varying uses as a fuel cell, as taught by Kajiyama et al.

With regard to the property limitations in the claims, although Millington et al. do not explicitly teach the limitations of volume resistivity, gas permeability, compressive strength, and electrical resistance measured between two copper plates, it is reasonable to presume that said limitations are inherent to the invention. Support for said presumption is found in the use of similar materials (i.e. cellulose-based woven fabric) and in the similar production steps (i.e. firing at a high temperature in a non-

oxidizing atmosphere to create a carbon fabric) used to produce the conductive carbon fabric. The burden is upon the Applicant to prove otherwise.

In the alternative, it would have been obvious to a person having ordinary skill in the art at the time of the invention to create the fabric with the claimed properties as a matter of optimization. For instance, Sharlit discloses that cellulose-based carbon fabrics may obtain higher conductivities by increasing heating time (column 2, line 60 – column 3, line 1). It would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust initial fabric structure and processing conditions in Millington et al. to obtain the desired properties, since it has been held that discovering an optimum value of a result effective variable involve only routine skill in the art.

With regard to claim 6, a person of ordinary skill in the art would presume a woven fabric to be a plain weave unless otherwise taught by the reference. With regard to claims 14 and 15, Millington et al. teach using cotton fibers (column 2, line 40).

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dickson et al. in view of Kajiyama et al. as applied to claim 3 above, and further in view of Fukuda et al. (U.S. Patent No. 5,236,687).

Dickson et al. do not teach orienting the fibers in the woven fabric as claimed. Fukuda et al. teach that when carbon fibers are oriented in the direction of the thickness of the web, the electric and thermal conductivity in the thickness direction is improved (column 3, lines 18-29). Thus, orientation of the fibers is a result effective variable that would affect the electric and thermal conductivity of the fabric in the thickness direction. It would have been obvious to a person having ordinary skill in the art at the time of the

invention to orient the fibers in the cloth of Dickson et al. as claimed by the Applicant in order to improve the electric and thermal conductivity of the fabric in the thickness direction, as taught by Fukuda et al, since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

6. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Millington et al. in view of Kajiyama et al. and alternatively Sharlit as applied to claim 3 above, and further in view of Fukuda et al.

Millington et al. do not teach orienting the fibers in the woven fabric as claimed. Fukuda et al. teach that when carbon fibers are oriented in the direction of the thickness of the web, the electric and thermal conductivity in the thickness direction is improved (column 3, lines 18-29). Thus, orientation of the fibers is a result effective variable that would affect the electric and thermal conductivity of the fabric in the thickness direction. It would have been obvious to a person having ordinary skill in the art at the time of the invention to orient the fibers in the cloth of Millington et al. as claimed by the Applicant in order to improve the electric and thermal conductivity of the fabric in the thickness direction, as taught by Fukuda et al, since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dickson et al. in view of Kajiyama et al. as applied to claim 3 above, and further in view of Kato (U.S. Patent No. 6,127,059).

Dickson et al. do not teach coating with a water repellent resin. Kato teaches that a water repellent resin may be applied to carbon fiber fabrics (column 4, lines 15-

37). Kato also teaches that the amount applied is a result effective variable because too much will cause blockage of the pores in the fabric, and too little will not provide enough rigidity to the cloth. It would have been obvious to a person having ordinary skill in the art at the time of the invention to apply between 5 and 60% water repellent resin to the fabric of Dickson et al. providing a water absorption height of less than 2 cm in order to give the fabric water repellent properties in an amount that does not block the pores of the fabric, as taught by Kato, since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Millington et al. in view of Kajiyama et al. and alternatively Sharlit as applied to claim 3 above, and further in view of Kato.

Millington et al. do not teach coating with a water repellent resin. Kato teaches that a water repellent resin may be applied to carbon fiber fabrics (column 4, lines 15-37). Kato also teaches that the amount applied is a result effective variable because too much will cause blockage of the pores in the fabric, and too little will not provide enough rigidity to the cloth. It would have been obvious to a person having ordinary skill in the art at the time of the invention to apply between 5 and 60% water repellent resin to the fabric of Millington et al. providing a water absorption height of less than 2 cm in order to give the fabric water repellent properties in an amount that does not block the pores of the fabric, as taught by Kato, since it has been held that discovering the optimum value of a result effective variable involves only routine skill in the art.

Response to Arguments

9. Applicant's arguments filed December 22, 2004 have been fully considered but they are not persuasive.

10. Applicant argues that there is no teaching or suggestion that one of ordinary skill in the art should adjust or would be able to adjust the process parameters of Dickson et al. to obtain a conductive cloth that had a lower thickness of less than that disclosed in Example 2. However, a person of ordinary skill in the art of woven fabrics could lower the thickness of the fabric by using smaller diameter fibers, for example. Adjusting the thickness of a fabric is not outside the scope of what would be known to a person of ordinary skill in the art. There is motivation for the adjustment because using a fabric with a lower thickness than that taught by Dickson et al. would allow the material to find additional uses as a fuel cell.

11. Applicant argues that Dickson et al. do not disclose Dickson et al. do not disclose that a carbon sheet can be obtained by selecting a specific cellulose-based woven fabric with a specific texture and carbonizing under specific conditions. However, the material of Dickson et al. meets the structural limitations of the claim. A reasonable basis has been provided for the claimed properties to be inherent. The burden lies with Applicant to prove the properties are not inherent. The burden is not overcome with the present arguments.

12. Applicant argues that Kajiyama et al. only set forth a general range of thickness useful for an electrode, but Kajiyama et al. do not disclose a carbon fabric can be made with such a thickness. Applicant asserts that the thicknesses provided in the Examples

are not within the claimed ranges and only apply to nonwoven fabrics. However, a person of ordinary skill in the art would be able to adjust the woven fabric of Dickson et al. to the thickness values taught by Kajiyama et al. by using smaller diameter fibers to create the fabric. This basic knowledge is well within the province of one of ordinary skill in the art. Kajiyama et al. teach the substrate may be between 0.1 and 2 mm (column 4, line 61).

13. Applicant argues that the material of Dickson et al. does not inherently possess the claimed properties. Applicant asserts that the process of Dickson et al. is different than that of the present invention. While there may exist processing steps in Dickson et al. that differ from those in the present invention, it is still reasonable to presume inherency because similar materials (i.e. cellulose-based woven fabric) and similar production steps (i.e. firing at a high temperature in a non-oxidizing atmosphere to create a carbon fabric) are used to produce the conductive carbon fabric, as set forth above in the rejection. Applicant asserts that the Examiner is merely guessing that the properties would be inherent in the reference, but it is not possible for the Office to conduct tests on these materials to determine whether claimed property limitations are found in the prior art. Applicant's burden to overcome the inherency rejection is not met with the arguments concerning the processing steps of Dickson et al. The material of Dickson et al. appears similar enough to presume inherency of the claimed property limitations.

14. Applicant argues Millington et al. do not clearly indicate that the cellulose-based fabric they employ is a woven fabric. However, Millington et al. disclose the material is

a fabric (column 2, line 43). And the only reference to fabrics in Millington et al. is in reference to woven fabrics (column 1, line 21). Millington et al. do not suggest that the fabric may be nonwoven, so it must be assumed that when Millington et al. discuss a fabric, they are referring to woven fabrics.

15. Applicant argues that inherency only exists when the process disclosed in the prior art necessarily and always produces the same result. However, Applicant has not proven that the process described in Millington et al. does not necessarily and always produce the same result, and the burden is upon Applicant to do so. Applicant asserts that the Examiner is merely guessing that the same result may be obtained, but once again, the Examiner cannot measure the properties of the fabric material of the prior art.

16. Applicant argues that Sharlit does not appear to teach the electrical resistance in the direction of the thickness of the woven fabric. However, Sharlit discloses that cellulose-based carbon fabrics may obtain higher conductivities by increasing heating time (column 2, line 60 –column 3, line 1). Improving the fabric of Millington et al. in the manner taught by Sharlit would result in improved electrical resistance in the thickness direction.

17. Applicant argues that Fukuda et al. do not relate to a woven fabric. However, Fukuda et al. do teach that orientation of fibers is a result effective variable that would affect the electric and thermal conductivity of the fabric in the thickness direction. A person of ordinary skill in the art could apply this knowledge to woven fabrics as well as nonwoven fabrics. Orientation of fibers in a woven fabric is easily adjusted by altering the tightness of the weave.

Conclusion

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy R. Pierce whose telephone number is (571) 272-1479. The examiner can normally be reached on Monday-Friday between 9am and 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JRP

Jeremy R. Pierce
April 28, 2005

ELIZABETH M. COLE
PRIMARY EXAMINER